Report Summary

BLACK BEAR MANAGEMENT TECHNIQUES

P&R Project W-127-R-20, Study 109

Michigan Department of Natural Resources

Wildlife Division

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For more detail and analyses, refer to: Etter, D.R.. 2002. Black bear population management techniques. Final report. Federal Aid in Wildlife Restoration Project W-127-R-20. Michigan Department of Natural Resources, Lansing, MI. 27 pp.

Abstract: We monitored 126 radio-collared black bears (*Ursus americanus*) from the northern Lower Peninsula (NLP) of Michigan to determine population dynamics. Sub-adult dispersal was extensive (males = 95%, females = 32%). Mean home-range size for males and females were among the largest reported for the species. Compared to bears from other regions, NLP bears have similar survival rates with hunting accounting for nearly 60% annual mortality. However, NLP sows breed earlier and have above average fecundity rates compared to sows from other regions. A simulated population model incorporating these empirical data suggests a sustainable annual harvest of approximately 300 bears from the NLP. Future research should include evaluation of important bear habitats and travel corridors, in addition to incorporation of bear demographic and social carry capacity information into simulated models. This information will assist additional black bear research projects, black bear management and future harvest strategies in Michigan.

Why was this study conducted?

→Black bear are viewed in many different contexts from constituents and special interest groups including hunters, outdoor enthusiasts, beekeepers and farmers.

→Black bear hunting generates significant revenue in Michigan

→Michigan residents passed Proposal G in 1996, which mandates the MDNR to use “principles of sound scientific management” in managing the state’s wildlife resources.

→Over the past 10-15 years, indices such as bear sightings, nuisance bear reports, and an annual bait survey indicate an increasing and expanding black bear population in the NLP.

→The combination of, reduction and fragmentation of suitable bear habitat, an increasing and expanding bear population, and an increasing and expanding human population pose potential problems for black bears and the constituents of Michigan.

What were the objectives of the study?

1) Determine the size, reproductive rate, age and sex specific mortality rate, dispersal rate and sustainable harvest level of the NLP black bear population.

2) Compare bear demographics between 2 NLP Bear Management Units (BMU).

3) Assist in developing permit drawings and information retrieval for hunts that regulate bear population structure and distribution in Michigan.

What information did we collect/compare?

→We trapped bears in the Baldwin and Red Oak BMUs.

→We marked 126 bears (64 males, 62 females) with radio-collars.

→We generally located bears a minimum of once every other week except in winter, May 1991 - March 2002.

→Cause of death was inferred from field necropsy and site inspection.

→We determined age of first reproduction, mean annual fecundity rates (cubs/female), and recruitment rates (percentage of cubs surviving to 1 year of age) from den checks of radio-collared females.

What did we learn about NLP bear home-ranges?

→For the different sex and age categories, the area used by bears was similar between the Baldwin and Red Oak BMUs.

→Sedentary male home-ranges (335 sq. miles) were greater than those of sedentary females (50 sq. miles).

→Home-ranges of females that dispersed and/or were translocated (486 sq. miles) were >9 times larger than those of sedentary females.

→Males that made natural or human induced movements had home-ranges nearly 3 times larger (928 sq. miles) than those of sedentary males.

→Barren females had larger home-ranges (92 sq. miles) than females with cubs (19 sq. miles) or yearlings (33 sq. miles)

→Home-ranges were nearly linear in shape for bears that we radio-tracked. Animals with linear shaped home-ranges maximize available resources while minimizing movement and energy use.

→Home-ranges for NLP bears are among the largest documented for the species and were much larger than those reported for bears from Drummond Island (females = 18.5 sq. miles, males = 29 sq. miles) and the UP (females = 10 sq. miles, males = 20 sq. miles,).

→Several reasons for discrepancies in area used by NLP bears compared to those from other areas include:

- We used lifetime telemetry information collected over 1 - 8 years to calculate home-ranges, where as most other studies collected data for 0.5 - 3 years.

- Bear densities in the NLP are relatively low compared to other studies allowing for greater partitioning of resources and greater movements by males in search of mates.

- The fragmented nature of habitat in the NLP may have forced bears to navigate around inhospitable areas thus increasing home-range size**.**

What did we learn about NLP bear movements and survival?

→No collared bears dispersed from the NLP during this study.

→For female yearlings with known fates, 9 of 28 (32%) dispersed. Eight dispersed between age 1-2 and one dispersed as a 5 year old.

→Twenty of 21 (95%) yearling males for which we knew fates also dispersed.

→We identified 4 sources of mortality for NLP bears, auto collision, legal harvest, illegal kill and nuisance kill.

→Legal harvest (including 3 bears lost to wounding during hunting season) accounted for 59% of annual mortality and was significantly different from all other causes of death.

→Auto-bear collisions and illegal kills accounted for 14% and 18% of annual bear mortality, respectively. Three bears killed for causing nuisance problems and 4 deaths from unknown causes accounted for the remaining 9% of annual mortality.

→Annual bear survival was 78%.

→There was no difference in seasonal or annual survivorship among sex/age classes of bears; however, post-breed/pre-den (including hunting season) and annual sub-adult male survival was the lowest of the four classes.

→In 1995, bear hunting regulations in Michigan changed to prohibit the harvest of sows in the presence of cubs. After the regulations change, sows with cubs were harvested at rates similar to those without cubs.

What did we learn about NLP bear reproduction and cub survival?

→Nearly all NLP sows bred by age 3 including 29% (6 of 21) 2 year olds from the Baldwin unit.

→Sows breeding for the 1st time from the Baldwin unit averaged 0.7 cubs per litter more than those from Red Oak; however, samples from Red Oak were low (N = 7).

→For sows that had bred previously, there was no difference in litter size between BMUs.

→Sows breeding for the 1st time produced fewer cubs per litter (2.04) than sows that had bred previously (2.85).

→For all sows combined, the average litter size was 2.6 cubs/sow.

→57% of NLP sows which had bred previously produced triplets and 17% produced quads.

→Sows produced male and female cubs at a nearly 1:1 ratio.

→Overall cub survival was 75%.

→Male and female cubs survived at similar rates between BMUs.

What conclusions can we draw from this information?

→It appears that the NLP contains one functional bear population. However, present division of the NLP into 3 BMUs is justified for distributing the harvest and to provide additional recreational bear hunting opportunities throughout the NLP.

→High natality and survival, particularly of adult females, contribute to the increase in the number of black bears in Michigan's NLP.

→The fact that nearly all NLP bears dispersed as yearlings may be attributed to younger age of sexual maturity and better overall condition of NLP black bears compared to those from other regions.

→Given the empirical data we collected, the bear population model predicts a pre-hunt NLP yearling + adult population of 1,307 bears for 2002. Furthermore, given present bear demographics the model predicts a sustainable harvest of approximately 300 bears or 23% of the population annually.

→Supplemental foods (e.g., human garbage) have been linked to increased reproduction and cub survival in bears, and NLP sows have high reproduction compared to sows from other regions. Whether changes in deer baiting regulations in the NLP have affected bear reproduction and cub survival warrants further investigation.

→Human induced changes to natural habitat may influence movements, survival and distribution of bears. Additionally, natural land features likely contribute to bear distribution and demographics. Therefore, future analysis of these data will focus on identifying important bear habitat components and travel corridors in the NLP.

→Currently, the harvest of black bears in Michigan is managed in ten distinct BMUs. BMUs help to distribute the bear harvest throughout the entire subsection, rather than allowing hunters to target animals in only optimal habitats. BMUs also help to assure that biological information obtained from harvested bears is representative of the entire subsection population. Information from this study will assist in future evaluation of BMU boundaries.

→Results of this research will assist with future and ongoing studies of black bear in Michigan. Researchers from MSU intend to assess of the genetic distribution and possible sub-populations of black bears. Home-range and dispersal information from this project will provide background information for assessing genetic distribution of bears and assist in determining the appropriate spacing of hair snares for a genetic population estimation study.

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